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ABSTRACT

This experiment investigated how sex of model and type of modeled behavior influenced achievement outcomes among elementary school children who had experienced difficulties learning mathematical skills in school. Children observed either a same- or opposite-sex peer model demonstrate either rapid (mastery model) or gradual (coping model) acquisition of skill in calculating with fractions. Findings indicated that observing the coping model led to higher self-efficacy, skill, and training performance. Children who observed coping models judged themselves more similar in competence to the models than did subjects who observed mastery models. Sex of model did not differentially affect achievement behaviors, and the sex of model x sex of subjects interaction was nonsignificant. Thirty-six references are provided. (Author/RH)

Peer Models:

Effects on Children's Achievement Behaviors

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Abstract

This experiment investigated how model sex and type of modeled behavior influenced achievement outcomes among children who had experienced difficulties learning mathematical skills in school. Children observed either a same- or opposite-sex peer model demonstrate rapid (mastery model) or gradual (coping model) acquisition of fraction skills. Observing a coping model led to higher self-efficacy, skill, and training performance. Children who observed coping models judged themselves more similar in competence to the models than did subjects who observed mastery models. Sex of model did not differentially affect achievement behaviors, and the sex of model x sex of subjects interaction was nonsignificant.

Peer Models:

Effects on Children's Achievement Behaviors

Much human learning occurs by observing the behaviors of others (Bandura, 1986). Research has explored how various factors influence observers' learning from models (Flanders, 1968; Rosenthal & Bandura, 1978; Zimmerman, 1977). For example, similarity to models in personal attributes (e.g., sex, age, skill level) can affect observational learning and task performance (Davidson & Smith, 1982; Rosekrans, 1967). Observers may believe that the more alike they are to models, the greater is the probability that similar behaviors will produce identical results (Bandura, 1986). Festinger (1954) discussed the need for individuals to compare their performances with those of others when objective performance standards were not available. Social comparison with similar others typically occurs when the performance in question depends on some underlying ability that varies across individuals (Goethals & Darley, 1977; Levine, 1983).

Perceived similarity to models also may influence observers' sense of <u>self-efficacy</u>, or personal beliefs about one's capabilities to organize and implement actions necessary to attain designated levels of performance (Bandura, 1982, 1986). Self-efficacy is hypothesized to be an important mechanism mediating behavior change. Self-efficacy can affect one's choice of activities, effort expenditure, persistence, and achievement. Individuals acquire information about their self-efficacy through their actual performances, vicarious (observational) experiences, forms of persuasion, and physiological indexes (e.g., sweating, heart rate).

Modeled performances constitute an important source of information about one's self-efficacy. As a result of observing others, individuals may believe

that they have acquired skills, which can raise self-efficacy (Schunk, 1985). Modeling also is a form of social comparison. Individuals who observe similar others perform a task are apt to believe that they also can perform the task, because modeling implicitly conveys to observers that they possess the necessary capabilities to succeed (Bandura, 1986). This sense of efficacy is substantiated later when observers succeed at the task (Schunk, 1985). Researchers have shown that observers' self-efficacy judgments depend in part on perceptions of similarity in competence to the model and on the outcome (e.g., success or failure) of the model's actions (Brown & Inouye, 1978; Zimmerman & Ringle, 1981).

The preceding considerations suggest that, although adults can serve as powerful models for transmitting behaviors to children (Bandura & Kupers, 1964), behaviors that are constrained by ability may be more susceptible to peer influence (Davidson & Smith, 1982). School children learn skills by observing their adult teachers, but observation of peer models may better enhance children's self-efficacy. In particular, an adult teacher flawlessly modeling cognitive skills may not promote high self-efficacy in children who have encountered previous difficulties with the subject matter and who likely view the teacher as superior in competence. Models of the same age and sex as children and whom children view as similar in competence may teach children skills and promote their self-efficacy for learning those skills (Schunk, 1985). In support of these ideas, Schunk and Hanson (1985) found that children who observed a same-sex peer (student) model solve subtraction problems developed higher self-efficacy for learning to subtract than did children who observed a teacher model solve the same problems.

The purpose of this study was to investigate how various attributes of peer models affected children's achievement behaviors. The subjects were children who had encountered difficulties learning mathematical skills in their regular classes. One attribute investigated was the type of modeled behavior. Among children who have experienced some difficulties learning cognitive skills, one means of increasing perceived similarity in competence might be to use coping rather than mastery models. The terms mastery model and coping model are derived from therapeutic contexts in which modeling is used to reduce avoidance behaviors in fearful clients (Meichenbaum, 1971). Coping models initially demonstrate the typical fears and deficiencies of observers but gradually improve their performance and gain self-confidence, whereas mastery models demonstrate faultless performance from the outset (Kazdin, 1978; Kornhaber & Schroeder, 1975; Thelen, Fry, Fehrenbach, & Frautschi, 1979). Coping models illustrate how determined effort and positive thoughts can overcome difficulties.

Research in therapeutic contexts shows that coping models exert beneficial effects on behavior and attitudes (Bruch, 1975; Kornhaber & Schroeder, 1975; Meichenbaum, 1971). In the Schunk and Hanson (1985) study, children observed either a peer mastery model or a peer coping model solve subtraction problems that involved regrouping; however, the mastery and coping models did not differentially affect children's self-efficacy, skillful performance, or perceptions of similarity in competence to the model. Schunk and Hanson noted that, although subjects' prior successes in subtraction were limited to problems without regrouping, children may have drawn on these experiences and concluded that if the peer model could learn, they could as well. In the present study, we used a task (fractions) that children had few,

if any, prior successes with in school. We expected that observing a coping model learn to solve fraction problems would lead to greater perceived similarity, and higher self-efficacy and skillful performance, compared with observing a mastery model.

We also explored the effects of model sex; children observed either a same- or a cross-sex peer model. Many psychological theories postulate that children are more likely to attend to and learn from same-sex models (Perry & Bussey, 1979); however, the literature is not clear on this point. Researchers have found benefits due to same-sex models (Barkley, Ullman, Otto, & Brecht, 1977; Bussey & Bandura, 1984; Fryrear & Thelen, 1969), benefits due to cross-sex models (Bussey & Bandura, 1984; Hicks, 1965; Perry & Bussey, 1979), and no differences due to model sex (Bandura & Kupers, 1964; Breyer & May, 1970; Rickard, Ellis, Barnhart, & Holt, 1970).

Researchers have suggested that children may be more likely to perform behaviors displayed by models who they believe are good examples of their sex role (Perry & Bussey, 1979; Spence, 1984); that is, sex of model may be less important than children's beliefs about how appropriate the modeled activity is for members of their sex (Bussey & Bandura, 1984). Accordingly, we did not expect differential effects on achievement behaviors due to sex of model. Although boys often expect to perform better in mathematics than girls, consistent differences do not emerge until junior high school (Eccles, Adler, & Meece, 1984; Meece, Parsons, Kaczala, Goff, & Futterman, 1982). We expected that our elementary-age male and female subjects would perceive learning to work fraction problems as appropriate.

Method

Subjects

The final sample comprised 80 students drawn from four elementary schools. Ages ranged from 9 years 3 months to 12 years 7 months ($\underline{M}$ = 10.6 years). The 40 boys and 40 girls represented various socioeconomic backgrounds but were predominantly middle class. Ethnic composition of the sample was as follows: 64% white, 18% black, 10% Hispanic, 8% Asian.

Subjects previously had been classified by the school district as working below grade level in mathematics. At the start of the academic year, children had been administered the Comprehensive Tests of Basic Skills (CTB/McGraw-Hill, 1982). Children whose mathematics total score was at or below the 35th percentile were assigned to below-level classes. At the time of this study, the subjects did not qualify for special education services.

Children's teachers were shown the fractions skill test and initially identified 87 students who they felt could not solve more than 10% of the problems. This selection procedure was followed because the experiment focused on processes whereby self-efficacy and skills could be developed when they were low, and because we felt that the coping model treatment would appear more credible to children who had few, if any, prior successes solving fraction problems. Seven children were excluded from the initial sample; three were absent and missed most of the training sessions, and four were randomly excluded from the appropriate cells to equalize cell sizes.

Materials

The self-efficacy test assessed children's perceived capabilities for correctly solving different types of fraction problems. For this assessment, 31 scales were portrayed on six sheets of paper. Each scale ranged in 10-unit intervals from not sure (10), through intermediate values (50-60), to really sure (100). The stimulus materials comprised 31 sample pairs of fraction

problems; each pair appeared on an index card. The two problems constituting each pair were similar in form and operations required, and corresponded to one problem on the skill test although they involved different numbers. The reliability of the efficacy measure was assessed in a pilot study with 15 comparable children who did not participate in the actual study. The test-retest reliability coefficient was .79.

The fractions skill test comprised 31 problems that tapped addition and subtraction as follows (examples in parentheses): addition, like denominators, no carrying (1/6 + 4/6); addition, like denominators, carrying (9/10 + 5/10); addition, unlike denominators, no carrying (5/16 + 2/4); addition, unlike denominators, carrying (11/15 + 37/45); subtraction, like denominators, no regrouping (7/9 - 3/9); subtraction, unlike denominators, no regrouping (21/36 - 8/18). Of these 31 problems, 21 were similar to those that children solved during the training sessions, whereas the other 10 were more complex. For example, during training students solved problems with two terms, whereas some skill test problems included three terms (1/3 + 2/12 + 1/4). Different forms of the skill test were used on the pretest and posttest to eliminate potential effects due to problem familiarity. Reliability was assessed during the pilot study; children's scores on these parallel forms correlated highly (r = .90).

The perceived similarity scale ranged from 10 to 100 in 10-unit intervals from I'm not as good (10-20), to We're the same (50-60), to I'm much better (90-100). The 10-unit interest scale ranged from 10 to 100 with the following verbal descriptors: not interesting (10-20), ok (40), pretty interesting (70), really interesting (90-100). The self-efficacy for learning instrument was identical to the efficacy measure described above.

Six sets of instructional material were used. Each set incorporated one of the six fractions operations described above (skill test). The format of each set was identical. The first page contained a full explanation of the relevant operation, along with two examples illustrating application of the solution strategy. The following pages each contained several similar problems to be solved using the designated strategy. Students worked on one set during each training session. Each set included sufficient problems so that children could not complete all of them during the session.

Videotapes

Videotapes that presented each of the six fraction skills in 7-8 min blocks were used rather than live modeling to ensure standardized presentation across subjects. Videotape participants were two female adult teachers and four peer (child) models (two boys, two girls); the peer models ranged in age from 10 years 1 month to 10 years 10 months (M = 10.3 years). Female teachers were used because most elementary teachers in the school district were women. Teachers and models were drawn from a different school district and were unfamiliar to subjects.

Videotapes were distinguished by the sex of the peer model (male - female) and the type of modeled behavior (mastery - coping). Each videotape depicted one teacher and either a male (peer) mastery model, a male coping model, a female mastery model, or a female coping model. Two versions were prepared of each of these four videotapes; each version portrayed one of the two teachers and one of the two male (or female) peer models. Thus, each of the two teachers was portrayed in all four videotapes, and each of the two male peer models and two female peer models was portrayed in both the mastery and coping videotapes.

Each videotape initially portrayed the teacher explaining and demonstrating how to add fractions with like denominators (no carrying). All work was conducted at a chalkboard to permit easier viewing. Following this 2-3 min demonstration, the teacher wrote a comparable problem on the board for the model to solve. On finishing the problem, the model was informed by the teacher that his or her solution was correct, after which the teacher erased the work and wrote another problem on the board. The model solved problems for the remainder of the block (5-6 min). While solving each problem, the model verbalized aloud the problem-solving operations and two different achievement beliefs. On completion of each 7-8 min block, the teacher explained and demonstrated the next fraction skill, after which the model was given problems to solve. The length of each videotape was about 45 min.

In the _male mastery model_ condition, the boy performed all operations correctly and worked at an average rate. Achievement beliefs verbalized by the model reflected high self-efficacy (e.g., "I can do that one"), high ability ("I'm good at these"), low task difficulty ("That was easy"), and positive attitudes ("I like working these"). The _female mastery model_ condition was identical except that a girl served as the peer model.

The _male coping model_ differed from the mastery model in problem-solving behaviors and verbalizations. Initially, the model was hesitant and made errors (e.g., 1/4 + 2/4 = 3/8). When errors occurred, the teacher supplied a prompt (e.g., "What do you do when the denominators are the same?") or referred to the problems she had worked. The peer model verbalized achievement beliefs reflecting low self-efficacy (e.g., "I'm not sure I can do that"), low ability ("I'm not very good at these"), high task difficulty ("These are tough"), and negative attitudes ("I don't like working these

problems"). As the tape progressed, the boy made fewer errors and began to verbalize coping statements (e.g., "I need to pay attention to what I'm doing," and, "I'll try to do my best"). Gradually the model improved his performance to where his problem-solving behaviors and verbalizations matched those of the mastery model. The female coping model condition was identical except that the model was a girl.

Procedure

The pretest was administered to children individually by one of six female adult testers drawn from outside the school. Testers followed a standardized set of instructions. Children initially received practice with the self-efficacy scale by judging their certainty of successfully jumping progressively longer distances. In this concrete fashion, children learned the meaning of the scale's direction and the different numerical values.

Following this practice, children were briefly shown the 31 sample pairs of fraction problems for about 2 s each. This brief duration allowed assessment of problem difficulty but not actual solutions; thus, children judged their capability to solve different types of problems rather than their certainty of solving any particular problem. The tester advised children to be honest and to mark the efficacy value that corresponded to their level of certainty for being able to correctly solve the type of problem depicted. After privately making each judgment, children covered it with a blank sheet of paper to preclude effects due to observing prior judgments. The 31 scores were summed and averaged.

The skill test was administered immediately following the efficacy assessment. Each of the 31 problems was portrayed on a separate sheet of paper. The tester presented problems to children one at a time, and verbally

instructed students to examine each problem and to place the page on a completed stack when they finished solving the problem or chose not to work on it any longer. Children were given no performance feedback on the accuracy of their solutions. The measure of skill was the number of problems solved correctly.

Following the pretest, children were randomly assigned within sex to one of four treatment conditions: male mastery model, male coping model, female mastery model, female coping model. Children assigned to the same experimental condition viewed the appropriate videotape in small groups. A female adult proctor introduced the tape by stating that it showed a teacher and a boy (girl) who was learning to work fraction problems. The proctor did not comment while children were watching the videotape.

The proctor administered three measures on completion of the tape: interest, perceived similarity, self-efficacy for learning. For the interest measure, children judged how interesting they found the tape to watch. This measure was collected because differential attention to the tapes could produce variations in self-efficacy unrelated to children's perceptions of similarity in competence to the model. For the similarity measure, the proctor asked children to think about the boy (girl) in the tape and to judge how they compared with the boy (girl) in learning to work arithmetic problems. The self-efficacy for learning measure, which was identical to the pretest efficacy assessment, required that children judge their certainty of learning how to solve different types of fraction problems rather than their certainty of being able to solve them.

All children received the fractions training program during 40-min sessions on six consecutive school days. Sessions were conducted by one of

six female adult proctors drawn from outside the school. For any given child, the same proctor administered all six training sessions, had not administered his or her pretest, and was unaware of his or her experimental assignment. At the start of each session, children met in groups of 4-5 with their proctor. The format of each training session was identical. The proctor initially reviewed the explanatory page by verbalizing aloud the solution steps and their application to the sample problems. Following this instructional phase (about 5 min), children solved two practice problems in the proctor's presence. The proctor stressed the importance of performing the steps as shown on the explanatory page, seated subjects at desks separated from one another, and moved out of sight. Children solved problems alone during the remainder of the session (about 30 min). If they were baffled on how to solve a problem they could consult the proctor who reviewed the troublesome operation.

Children received the posttest on the day following the last training session. For any given child, the tester was unaware of the child's experimental assignment and of how the child had performed during the training program. The self-efficacy and skill instruments and procedures were identical to those of the pretest except that the parallel form of the skill test was used. Tests and training materials were scored by an adult who had not participated in the data collection and who was unaware of children's experimental assignments.

Results

Means and standard deviations of all measures are presented by experimental condition in Table 1. Preliminary analyses of variance (ANOVAs) yielded no significant between-conditions differences on pretest measures

(self-efficacy, skill). There also were no significant differences on any measure due to tester, school, or videotape versions (within conditions).

Insert Table 1 about here

Self-Efficacy/Skill

Intracondition changes (pretest to posttest) on each measure were evaluated using the t test for correlated scores (Winer, 1971). Among boys, observing either a male coping model ($p < .01$), male mastery model ($p < .05$), or female coping model ($p < .05$), led to a significant improvement in self-efficacy. Observing a male or female coping model significantly enhanced self-efficacy among girls ($ps < .01$). All eight experimental conditions showed a significant gain in fractions skill from pretest to posttest ($ps < .01$).

Posttest self-efficacy and skill were analyzed with a 2 (sex of model: male - female) x 2 (type of modeled behavior: mastery - coping) x 2 (sex of child: boy - girl) multivariate analysis of covariance (MANCOVA) using the corresponding pretest measures as covariates. This analysis yielded a significant main effect for type of modeled behavior, Wilks's lambda = .561, $F(2, 69) = 27.04$, $p < .001$; all other main effects and all interactions were nonsignificant. Univariate analyses of covariance (ANCOVAs) revealed significant main effects for type of modeled behavior on each measure: self-efficacy, $F(1, 71) = 28.00$, $p < .001$ ($MS_e = 152.50$); skill, $F(1, 71) = 45.46$, $p < .001$ ($MS_e = 11.15$). Observing a coping model significantly enhanced children's self-efficacy and skillful performance compared with observing a mastery model.

Videotape Measures

The perceived similarity measure was analyzed with a 2 (sex of model) x 2 (type of modeled behavior) x 2 (sex of child) ANOVA. This analysis yielded a significant main effect for type of modeled behavior, $F(1, 72) = 12.95$, $p < .01$ ($MS_e = 602.64$). Similarity judgments of children who observed a coping model were significantly higher than those of children who observed a mastery model. Inspection of Table 1 shows that the mean similarity judgments of children assigned to coping model conditions, with one exception, fell into the 50-60 range (We're the same), whereas the mean scores of subjects assigned to mastery model conditions were lower than 50, or toward the 10-20 (I'm not as good) end point. Compared with subjects who observed a mastery model, therefore, children who observed a coping model judged themselves more similar in competence to the model. ANOVA applied to the interest measure yielded nonsignificant results.

Self-efficacy for learning was analyzed with a 2 x 2 x 2 ANCOVA using pretest efficacy as the covariate. This analysis yielded a significant main effect for type of modeled behavior, $F(1, 71) = 24.91$, $p < .001$ (MS_e = 226.70); main effects for sex of model and sex of child and all interaction effects were nonsignificant. Observing a coping model led to significantly higher self-efficacy for learning to solve fraction problems compared with observing a mastery model.

Training Performance

The number of problems that children completed during the training program was analyzed with a 2 x 2 x 2 ANOVA to determine whether experimental conditions exerted differential effects on children's motivation. This analysis yielded a significant main effect for type of modeled behavior, F(1,

72) = 38.06, $p < .001$, (MS_e = 389.47). Children who observed a coping model completed significantly more problems during training than did subjects who observed a mastery model. More rapid problem solving was not attained at the expense of accuracy; an identical pattern of results was obtained using the proportion of problems that subjects solved correctly (total number correct divided by total number completed) as the measure of training performance.

Correlational Analyses

Product-moment correlations were computed among posttest self-efficacy, posttest skill, perceived similarity, self-efficacy for learning, and training performance (number of problems completed). Posttest self-efficacy was positively related to all measures ($ps < .01$), as was posttest skill ($ps < .01$). The more similar in competence children judged themselves to the model, the higher were their self-efficacy for learning scores and their rate of problem solving during training ($ps < .01$). Self-efficacy for learning also was positively correlated with training performance ($p < .01$).

Discussion

The results of this study support the idea that the type of modeled behavior can have important effects in achievement settings. Children who observed a single peer model cope with initial difficulties but gradually learn to work fraction problems demonstrated higher self-efficacy for learning, training performance, and posttest self-efficacy and skill, compared with children who observed a single peer mastery model. These benefits cannot be due to instructional factors, because the mastery model treatment contained the same instruction and problem solving. We also do not believe that attentional factors were responsible, because children's judgments of their

interest in viewing the videotapes did not differ as a function of treatment condition.

The obtained effects of observing a coping model support the idea that perceived similarity in competence to models is an important means of conveying information about one's self-efficacy for learning (Bandura, 1986; Brown & Inouye, 1978; Schunk, 1985), because children judged themselves more similar in competence to the coping model than to the mastery model. Modeling is a type of social comparison, which can inform children about their own capabilities (Goethals & Darley, 1977; Levine, 1983). Children who observe similar others perform a task are apt to experience higher self-efficacy for learning (Bandura, 1986; Schunk, 1985). This initial sense of self-efficacy is substantiated later when children work at the task and perform successfully.

As Meichenbaum (1971) notes, however, the benefits of coping models can arise due to increased perceived similarity between observers and models or to explicit modeling of coping techniques to overcome difficulties. In the present study, coping techniques were conveyed through the actions and verbalizations of the model, which stressed such factors as concentrating and working hard. Although the teachers in the videotapes did not explicitly instruct the peer models to use these coping techniques, it is possible that subjects learned that increased concentration and hard work could produce better results. Such beliefs can raise self-efficacy (Bandura, 1986; Schunk, 1985). Future research might disentangle the effects of increased perceived similarity from those due to modeling of coping techniques by including a treatment in which a peer model uses coping techniques but demonstrates the rapid learning characteristic of a mastery model.

We wish to qualify the obtained benefits of observing a coping model, because the subjects were children who had experienced difficulties learning mathematical skills and who had few, if any, prior successes with fractions. Therapeutic advantages of coping models typically involve fearful subjects in threatening situations that have been fraught with failures (Bruch, 1975; Kornhaber & Schroeder, 1975; Meichenbaum, 1971). In achievement settings, benefits of coping models might be obtained with students who find tasks anxiety provoking or who typically experience difficulties learning new material. Schunk and Hanson (1985), for example, found no differences between coping and mastery models among children who had some previous successes with the subject matter. Schunk and Hanson suggested that children may have focused on what the models had in common (i.e., task success), and concluded that if the peer model could learn, they could as well. Among normal learners, observing a mastery model might promote self-efficacy better. Observation of a peer having difficulty learning could convey high task difficulty, which will not raise children's self-efficacy for learning (Schunk, 1985).

We found no significant effects on any measure due to sex of model or to sex of subjects. Although some research shows that same-sex models exert more powerful effects on behavior than cross-sex models (Barkley et al., 1977; Fryrear & Thelen, 1969), the appropriateness of modeled behavior seems more important than the sex of the model (Bussey & Bandura, 1984; Perry & Bussey, 1979). Children will perform the actions of cross-sex models when these actions are viewed by children as appropriate for members of their sex. Given these considerations, we believe that learning to work arithmetic problems in elementary school is not a sex-typed activity. Other research shows that sex

differences in perceived capabilities and mathematical performances do not reliably emerge until junior high school (Meece et al., 1982).

Consistent with previous similar research (Schunk & Hanson, 1985), the present study supports the idea that self-efficacy is not merely a reflection of prior performances. Although children's pretest efficacy judgments did not differ as a function of experimental treatment, between-conditions differences emerged following children's observations of the videotaped models. Higher self-efficacy brought about by observing peer models likely was substantiated during the training program, and led to higher performance on the posttest (Schunk, 1985). This study also shows that capability self-perceptions bear an important relationship to subsequent achievement. Personal expectations for success are viewed as important influences on behavior by a variety of theoretical approaches to achievement (Corno & Mandinach, 1983; Covington & Beery, 1976; Kukla, 1972; Schunk, 1985; Weiner, 1979).

Future research needs to examine peer modeling in greater detail to determine how children's self-efficacy and achievement are influenced by different model attributes. The present results suggest that, with children who have experienced some previous learning difficulties, coping behaviors are beneficial. Before we will make a general recommendation concerning their use, however, research needs to explore their effects with various types of tasks. With tasks that children believe are easy, for example, a single mastery model may promote children's self-efficacy, even among the present type of subjects. Knowledge of the attributes of peer models that children attend to and of the process by which children form efficacy judgments has important implications for teaching.

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Table 1

Means (and Standard Deviations)

Measure	Phase	Male Model: Mastery Boys	Male Model: Mastery Girls	Male Model: Coping Boys	Male Model: Coping Girls	Female Model: Mastery Boys	Female Model: Mastery Girls	Female Model: Coping Boys	Female Model: Coping Girls
Self-Efficacy (Average judgment per problem; 10 (low) - 100)	Pretest	52.8 (18.2)	52.9 (24.0)	55.9 (20.4)	58.2 (25.1)	60.3 (21.9)	56.3 (20.0)	56.2 (25.6)	60.8 (20.0)
	Posttest	72.8 (8.9)	68.5 (15.8)	85.5 (13.2)	84.4 (14.2)	72.3 (9.6)	69.8 (14.2)	85.7 (9.1)	86.7 (11.5)
Skill (Number of correct solutions on 31 problems)	Pretest	2.3 (2.9)	2.1 (3.0)	2.3 (3.4)	2.4 (3.2)	2.6 (3.8)	2.7 (3.3)	3.0 (3.0)	3.4 (3.7)
	Posttest	8.5 (3.1)	8.2 (1.9)	13.7 (4.9)	13.6 (4.4)	9.4 (3.4)	8.2 (2.7)	13.7 (3.3)	14.1 (4.4)
Perceived Similarity (10 (not as good) - 100 (much better))	---	39.0 (24.7)	33.0 (24.1)	66.0 (11.7)	56.0 (27.2)	42.0 (28.6)	38.0 (27.8)	54.0 (22.2)	55.0 (25.9)
Interest (10 (low) - 100)	---	45.0 (24.6)	42.0 (23.9)	41.0 (25.1)	40.0 (19.4)	52.0 (31.6)	51.0 (25.1)	52.0 (21.5)	43.0 (25.4)
Self-Efficacy for Learning (Average judgment per problem; 10 (low) - 100)	---	65.8 (28.4)	69.9 (18.5)	90.4 (10.1)	84.1 (10.0)	69.2 (21.2)	70.9 (14.0)	86.9 (9.4)	84.5 (11.7)
Training Performance (No. of problems completed)	---	162.2 (22.4)	157.4 (24.6)	187.2 (8.2)	186.1 (9.4)	161.8 (22.1)	153.4 (29.5)	184.5 (17.3)	185.9 (14.0)

Note. $N = 80$; n per condition = 10.